

The world needs
concrete solutions

Non-reinforced concrete pipe

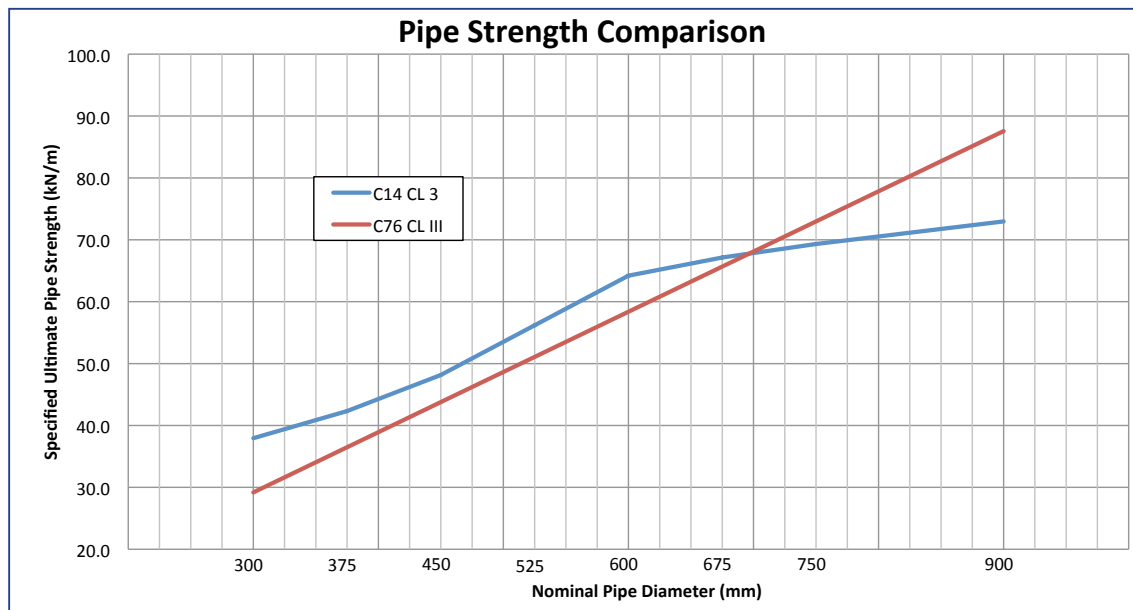
a resilient pipe product for critical infrastructure

Non-reinforced concrete pipe offers the same superior qualities of strength, durability and versatility as reinforced concrete pipe, but at a significantly lower cost.

How strong is non-reinforced concrete pipe?

Non-reinforced concrete pipe is a rigid pipe that has significant inherent structural strength. Manufacturing technology allows non-reinforced concrete pipe to be produced with strengths comparable to that of reinforced concrete pipe. The graph that follows shows that the specified ultimate strength of non-reinforced ASTM C14 Class 3 concrete pipe actually exceeds that of reinforced ASTM C76 Class III concrete pipe up to 675mm inside diameter pipe.

Typically, non-reinforced concrete pipe can be used in applications with 1 to 4 metres of cover, depending on bedding and backfill conditions (always to be confirmed by the designer).



How much does non-reinforced concrete pipe cost?

Because non-reinforced concrete pipe does not require reinforcing, it is less costly than its reinforced concrete pipe equivalent. The low cost makes non-reinforced concrete pipe price competitive with many small diameter flexible pipe materials such as polyvinyl chloride, high density polyethylene, polypropylene and corrugated steel.

Where is non-reinforced concrete pipe accepted?

Most major municipalities throughout Western Canada allow the use of non-reinforced concrete pipe. For example, the City of Edmonton, City of Calgary, City of Regina, and City of Winnipeg all allow ASTM C14 pipe in some capacity. Specifiers, designers and contractors should always check to determine if non-reinforced concrete pipe is an option, since non-reinforced concrete pipe can help to reduce the cost of your next project.

Does non-reinforced concrete pipe have a proven history?

Non-reinforced concrete pipe has been used reliably in North America for well over 150 years for sanitary sewers, storm drains and culverts. In Western Canada, we have been supplying the public works and construction industries with non-reinforced concrete pipe since 1976. ASTM C14, *Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe* is the most common specification for non-reinforced concrete pipe. The Standard Specification was first published in 1917 and continues to be widely accepted in the 21st century. In Canada, CSA A257.1 (*Circular Concrete Culvert, Storm Drain, Sewer Pipe, and Fittings*) – a metric specification similar to ASTM C14 – can also be specified. No other sewer or culvert pipe has a longer history of proven performance than non-reinforced concrete pipe.

How do I design non-reinforced concrete pipe?

Like reinforced concrete pipe, the design of non-reinforced concrete pipe is based on the three-edge bearing test strength (indirect design). The required three-edge bearing strength for all concrete pipe is calculated using the following equation:

$$\text{Three Edge Bearing} = \left[\frac{\text{Total Load on Pipe}}{\text{Bedding Factor}} \right] \times \text{Factor of Safety}^*$$

*For non-reinforced concrete pipe, a factor of safety of 1.5 on ultimate strength is typically used.

Once the required strength has been calculated, the strength can be compared to the pipe design ultimate strengths. Inland Pipe produces non-reinforced concrete pipe to the following ASTM C14 and CSA A257.1 strengths:

Nominal Diameter (mm)	300	375	450	525	600	675	750	900
Minimum TEB Strength (kN/m)	38	42	48	56	64	67	69.5	73

It is important to note that the 0.3mm crack strength of reinforced pipe is used for non-destructive testing and should not be compared to the ultimate strengths listed above for non-reinforced pipe.

How do I install non-reinforced concrete pipe?

Non-reinforced concrete pipe is handled in the same manner as reinforced pipe. Non-reinforced concrete pipe is installed with the same bedding and backfill material and methods as reinforced concrete pipe. A full range of prefabricated fittings (mitred bends, wyes and tees) is available for non-reinforced concrete pipe.

Non-reinforced concrete pipe is produced using the same forms as reinforced concrete pipe; therefore, the physical dimensions and joints are identical for both types of pipe. Consequently, reinforced and non-reinforced concrete pipe are interchangeable - no transition pieces are required. This allows for the installer to place reinforced concrete pipe in areas of excessive loading (railway crossings or deep bury), while using the lower-cost non-reinforced concrete pipe for sections of projects that do not require reinforced concrete pipe.

How do I learn more?

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